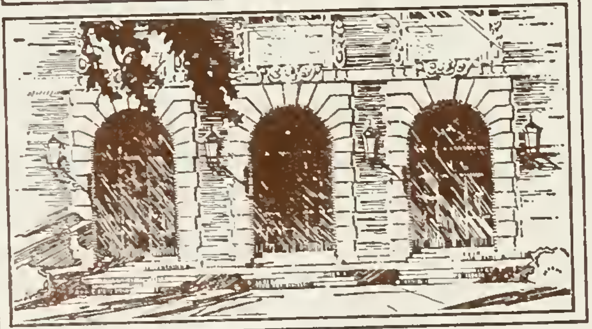
LIBRARY OF THE
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

016.7114
C73e
no. 602-614



CITY PLANNING AN
LANDSCAPE ARCHITE

016.714 Council of
C73e Planning
602-614 Librarians

UNIVERSITY OF ILLINOIS LIBRARY

Name Binding
Identification Number 7-31-74
Address [illegible]
[illegible]
Out 3-26 81

Digitized by the Internet Archive
in 2010 with funding from
University of Illinois Urbana-Champaign

http://www.archive.org/details/communicationasp608gold

Council of Planning Librarians EXCHANGE BIBLIOGRAPHY

608

July 1974

COMMUNICATION AS A PHENOMENON FOR DESCRIPTION AND PREDICTION: An Urban Determinant

Harold Goldstein
Rockaway Beach, New York

THE LIBRARY OF THE
JUL 25 1974
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Mrs. Mary Vance, Editor
Post Office Box 229
Monticello, Illinois 61856

COUNCIL OF PLANNING LIBRARIANS Exchange Bibliography #608

COMMUNICATION AS A PHENOMENON FOR DESCRIPTION AND PREDICTION: AN URBAN DETERMINANT

by

Harold Goldstein
Rockaway Beach, New York

IN THE BEGINNING...

It is generally possible, upon investigation of basic geographic and historical factors, to hypothesize with some degree of accuracy just why and how a city had its beginning. It may have been built at the juncture of important rivers or at the mouth of a river for trade or strategic military purposes (i.e. Belgrade, New Orleans); it may have developed on a hill or series of hills so as to provide a defensive advantage (i.e. Budapest); it may have developed as an outpost on a trading route (i.e. Beersheba); it may have developed because of proximity to a rich supply of a raw material (i.e. Pittsburgh); it may have naturally developed as the hub of activity for a busy region; and so forth.

Upon further investigation of historical and developmental factors, it is also possible to reconstruct the sequence through which a city experienced growth. It might be that the city grew initially around a town square, then expanded along two or three main arteries and spread along the coast of a nearby lake. Perhaps as a railroad line became developed, the city grew radially along the railroad right-of-way and outwards along feeder roads to railway stations. A subcenter might have developed as a large industry began to prosper at a convenient location a small distance from the city...etc., etc.

In any case it becomes apparent that "cities were evolved primarily for the facilitation of human communication."(25) (Cities built for military reasons might be said to hinder some types of communication -- that is to negatively facilitate them.) "Originally they made it possible to communicate by enabling people to live close together in a relatively small space..."(28) As the scale of civilization advanced, more complex and far reaching forms of communication were demanded...and found; the urban entity grew correspondingly more complex. As an example familiar to everyone, "the automobile...introduced an entirely new dimension (to communication). Instead of relying on nearness to achieve communications, the cities enabled us to communicate by overcoming distance..."(28) The city of today has been designed to facilitate (supposedly) the use of the automobile. In fact, until recently, a plan for effective vehicular movement seems to have been the primary concern in city planning circles. Today, of course, there is a movement to have us plan for the automobile and not to allow the automobile plan for us.

This is a very typical example of the phenomenal growth of urban communication systems. Congestion on the highways is not very different from the high volumes of electric usage that caused the massive power failure in the northeast a few years ago; from the amounts of mail that are troubling our post offices and are causing the price of a letter to rise sharply; from the 'written diarrhea' that has resulted in a fantastic proliferation of magazines, journals, and books; and so on. And just as our man-made channels have clear capacities, so do our own individual channels. The high levels of interaction that characterize urban life often approach these capacities; thus the social pathologies associated with urban living. But whatever the effect, communications of all types have come to dominate the urban scene; have, in fact, become the very basis of urban living and, as such, guide the shape of urban development.

PROCESSES OF GROWTH

If this rather rash statement is accepted, for the moment, it then follows that communication, as an important and perhaps even the most important determinant of urban growth, must serve as the focus of any theory which purports to describe urban growth...urban structure... urban processes...urbanity. And acceptance of the very powerful assertion put forth does not seem at all unreasonable.

"...Compelling explanations for strengthening the relations (that are generated by and maintained in an urban network) are sought in the intensification of communications, the accumulation of knowledge about nature, and the formulation of specific social controls regulating public behavior. Language and commerce must be heavily involved. With that kind of suggestive material at hand it is possible to assemble a deductive system which promises not only to explain the civic bond in terms of more basic assumptions but to assist in the measurement of key parameters in urban socio-cultural systems.

"The basic unit seems to be that of the transaction. The central concept is clear enough so that the precise delimitation of what constitutes a transaction can wait. It implies exchange between individuals or groups participating in a society. The exchange may involve goods...or services, but not necessarily. A transaction always involves some communication of information..."(25)

So, if I define communication very loosely to include any transmission of materials, people or information, then any interaction between a sender and a receiver becomes a communication. Just as bonds are developed and intensified between individuals through repeated interaction, so are bonds developed between groups. It is through the growth of such bonds that society develops in all its complexity.

"That communications are bound up closely with major changes in society...is well put by Servan-Schreiber in Le Defi American when he says 'Urbanisation, automation and communication have obviously separate effects, but much of their impact interacts. We may consider them as convergent forces which will forge a new society...' Clearly we must accept this view for it is reinforced again and again in the literature, and perhaps more important, it seems most sensible and probable."(4) Although this might be a bit naive, it often pays to let logic run its course. Many great insights into science were developed through an extension of a logical exercise.

History seems to bear out our basic idea. "An intensification of communications, knowledge and controls... (seems) to be highly correlated with the growth of cities. The bonds that tie individuals to the city seem to result from the conservation and accumulation of some concomitant of these factors."(25)

The processes of growth of our urban areas, although identifiable, are still somewhat elusive in that, try as we may, we have been distinctly unsuccessful in controlling them. It is patently absurd that in times as these, when we can create fantastically complex systems that perform untold marvels, we cannot control the development of our own settlements. There are many reasons for this but they may be conveniently condensed; the urban system is, itself, unbelievably complex. Its parts are, for the most part, non-deterministic. Whereas we understand very well the principles that enabled us to fly to the moon, we do not understand the workings of the urban system. Furthermore, whereas the moon program or other scientific programs can start from scratch and develop systems without constraints, we have to work with the city as it is. Even if we understood the totality of the urban system, the given physical, economical, political, and human constraints are enormous. An engineering economics analysis might even suggest that we give up and attempt to start over on another planet.

These difficulties aside, if we hope to ever be able to control urban development processes, to meaningfully approach the urban crisis, we must begin to learn about the urban system. And if we are to ever understand the urban system in its fundamentals, we must isolate and analyze the major determinants of its form. And if communication is one of these, then it will be through an understanding of urban communication phenomena that the learning process will begin.

THE CITY AS A COMMUNICATIONS NETWORK

Today the city can offer advantages such as 'economies of scale', 'added accessibility', 'increased opportunities', etc. These factors may all be considered as communication related. For what are 'economies of scale' but factors resulting from increased clustering, i.e. from improved possibilities of communication, that result in efficiencies of operation. What is 'added accessibility' but increased opportunity for making contacts, for communication. Where do 'increased opportunities' come but from better chances to communicate on an increased scale.

In general "...external economies (such as those just mentioned)...resulting from changes in activities (or from any of a number of other reasons) are most available to neighbors, because information concerning the opportunities arrives there first."(25) This argument may be extended; our communication networks make most of the urban population 'effective neighbors'; information travels very fast over such networks.

"Opportunities also appear at linkage points in communication systems and entrepeneurs locating there obtain access to several independent sources of information first. Thus change encourages change in the vicinity of a communication focus, and activity is piled upon activity within a small amount of space..."(25) The net effect, then, of our expanding communication networks is to bring the urban entity closer together and, in doing so, provide an ever widening variety of choice to a larger and larger percentage of the population.

In this way the original purpose of the city is being fulfilled. But there may be a drawback. Christopher

Alexander asserts that "people come to cities for contact ...but that contacts (have become)...empty and unsatisfying."(1) The same factors that have lead to such a wide variety of choice, have depersonalized the contacts that result. Although cities have become communication networks, their design does not encourage nor facilitate intimate communication, and herein lies a basic flaw. Alexander would like to consider the city as a 'mechanism for sustaining human contact' but feels that it has developed in the opposite direction.

Pointing up, perhaps unwittingly, this dehumanizing, impersonal view of the city is Richard Meier's conception of 'the metropolis as a transaction-maximizing system'; "a social engine that mobilizes action and powers progress".(26) When he says that "the salient transactions in urban society are soon to be reported with all pertinent data--who, when, where, what, how much money transferred, linkages, and so forth,"(26) he clearly identifies his leaning. To Meier the city is merely a big black box whose purpose is to increase the efficiency, but not the meaning, of making contact. This may be entirely correct.

And such hypothetical descriptions can be of great value. Todays cities are the results of a 'random walk' that has been continuing for hundreds of years; our decision making processes are devoid of direction. If there were an identifiable focus, if we could accept the city as a 'transaction maximizing device' or as a 'mechanism for sustaining human contact' we'd, at least, have a goal with which to work. It is ridiculous to hope to achieve an end, an ideal city, without having anything to shoot for, without a simple direction to follow. But I digress, the point here is that cities may be viewed as communication facilitation devices; as communication networks "...actively involved in the business of producing and distributing the information that is the essential stuff of civilization - the accumulated wisdom, descriptive accounts, ideas and theories, reports of human events, laws, contracts, records of transactions, gossip and the additional products of the arts and sciences."(39)

We may also consider the quality as well as the quantity of communication and, as such, the level of information interchange may be seen as a measure of cultural wealth. Meier has suggested that an index to the cultural wealth of populations be developed through measures of the variety and volume of information flowing through the public communication channels. A social accounting scheme, in a fashion analagous to national income accounting, could be used to analyze the information received by the average person. Per capita income would be given a new dimension. In less advanced societies the volume of information flowing through the public channels is small; in highly developed societies the rate of information flow are, as we have seen, much higher. This could provide "the conceptual tool...for systematically estimating our own cultural progress and for evaluating the effectiveness of various governmental programs designed to foster cultural growth (and thus)...for evaluating the relative cultural wealth of different cities, of different parts of cities, and for recording changes in time. In addition, it may offer a device for evaluating the effectiveness of various plans and programs for urban spatial structure."(39)

Cross cultural comparisons would also be possible. Of interest is the existance of cultural boundaries. "A cluster of individuals interacts within these...limits (i.e. the zone of uncertainity between cultures) and the messages flowing back and forth across the boundaries indicate the extent to which an urban culture is connected with others of its kind to make up a national, and eventually worldwide, culture."(25)

CYBERNETICS, INFORMATION THEORY AND COMMUNICATION

"The first problem that arises in achieving a systematic description of the metropolis is that of understanding and explaining the differentials in density, labor productivity and land value that distinguish metropolitan from rural communities in the same society. The description should be undertaken in terms of simple, isolable and preferably manipulable, phenomena."(25)

Now communication is, in appearance, a simple phenomenon, but it is debatable if it is isolable, and it certainly is not very manipulable at this time. However this is not to say that we are not dealing with isolable, manipulable phenomena. Research is presently being done on many aspects of communication, with the possible exception of the communication aspects of urban development. This work is likely to result in a better understanding of communication and how we might apply it to understand ourselves.

A whole science, Cybernetics, has been developed to treat the subject of man-machine communication. Cybernetics, though, has much wider applicability. The study of man-machine communication can provide insight into the workings of man-man communication systems. "Modern studies of communication engineering suggest that the behavior of human organizations, peoples and societies has important relations in common with manmade communication networks, such as servomechanisms, switchboards, and calculating machinery, as well as the behavior of the human nervous system and the human mind."(49) Weiner, the coiner of the term Cybernetics, feels in fact that "society can only be understood through a study of the messages and the communication facilities which belong to it; and that in the future development of these messages and communication facilities, messages between man and machine, between machine and man, and between machine and machine are destined to play an ever increasing part."(57) (underlining provided)

So Weiner elected to use the word Cybernetics (from the Greek Kubernetics or steersman - from which the word governor was derived) to embrace the entire field of thought dealing with the many ramifications of the theory of messages. He recognized the "electrical engineering theory of the transmission of messages (but sought to include) the larger field which includes not only the study of language but the study of messages as a means of controlling machinery and society, the development of computing machines and other such automata, certain reflections upon psychology and the nervous system, and a tentative new theory of scientific method."(57) The intense study of communication as a phenomenon in itself will, perhaps, provide clues towards a methodology of transforming it into an isolable, manipulable phenomenon.

The more identifiable technical aspects of Cybernetics had long been studied as disciplines in themselves. The 'electrical engineering theory of messages' had developed in the 1920's under the nomer Communication Theory. This is scientific theory in its strictest sense; it is based on a solid foundation of mathematical theory. Communication Theory is not of immediate interest here; the "theory concerns the signals alone, and their information content, abstracted from all specific human uses. It concerns not the question 'What sort of information?' but rather 'How much information?'"(17) But rest assured, some day there will be a connection after we clear up thousands of little conceptual issues, perhaps then we may begin to apply Communication Theory to urban research.

The term Information Theory has been used more or less synonymously with Communication Theory in most instances. Or, more accurately, a distinction is rarely made between the two in todays writings. Here a distinction will be made. Information Theory will be said to include the highly structured, mathematical Communication Theory, but will not be restricted to it. "Questions of extracting information from nature and of using this information to change our models;"(47) the development of the entropy-information analog (to be discussed in the following section); experimentation with analogs to behavioral patterns; all these lie outside the realm of Communication Theory but would be embraced by Information Theory. Cybernetics and Information Theory may be viewed as one and the same, both embracing the theory of messages and all its ramifications.

Important in terms of potential extensions to urban communication is the prevalent in Information Theory. "There are several advantages in using electric networks, nerve systems, and societies as analogs for each other, provided we remember that analogy implies similarity only in certain relations between the constituent elements of each system. We gain the aid of new and perhaps more efficient models for our thinking about minds and societies. These new models offer suggestive analogies for... relationships which have often been considered crucial in social science."(49) Thus we may think about concepts which have traditionally been considered qualitative in quantitative terms. Further, the analogs can provide insights that might suggest realistic means of approaching the quantitative goals; methods of data collection, interpretation and usage.

An example close to our area of interest is the application of gravity concepts to human clustering. It has been applied 'successfully' to a wide variety of problems such as inter and intra-urban trip distribution, problems of industrial location, and questions of population distribution. But just as Newton's field theory was inadequate to represent sub-microscopic models of the real world, the gravitational analog has its limitations. Physicists moved ahead, though, and have developed quantum theory, a statistical mode of theorizing, which can be more rigorously applied than the old Newtonian models. "The social sciences have not yet reached a state where such a quantum theoretical approach has been developed, although many of the essential insights have been developed."(25)

One may consider the civic bond as analogous to the molecular bond, and the transmission of messages as analogous to the motion of protons, neutrons, and electrons. The larger the intensity of message interchange, the more transactions that occur, and the stronger the bond. "The more internal communication there is in a city, the more coherent it must be."(25) This argument presumes that socio-cultural bonds, such as urban bonds, kinship bonds, fraternal bonds, etc., may be measured. Although messages are infinitely more numerous than trips, they may be treated similarly through an origin-destination framework. So just as our major transportation studies investigate travel patterns (which indeed are a measure of inter-areal bonds) so may a study of communication patterns provide valuable data.

Thus, just because we cannot easily apply communication concepts today there is no reason to assume we will not be able to apply them tomorrow. The history of science indicates, through numerous examples, that statements issued with an air of finality are dangerous, especially those dealing with the impossibility of attaining some goal. For example, in 1932 a distinguished British committee investigating the possibility of making "quantitative estimates of sensory events" split wide on the meaning of measurement; the conservative wing came to the "natural and obvious conclusion that subjective measurements of loudness in numerical terms (like those of length...) are mutually inconsistent and cannot be the basis of measurement."

There should be no question, then, of the possibility of creating an exact quantitative description of many aspects of the urban entity. Practically speaking, how close to exact we can come, and how soon we can expect to benefit are the questions that should concern us. "... caution must be exercised in borrowing ideas from another universe of discourse, especially where fields differ widely."(56) But the keen thinkers of today are looking forward to the innovative introduction and use of quantitative models in many fields. "While adaption of a cybernetic model will certainly not solve all the problems confronting social psychologists, intelligently used, it can become a valuable tool...innumerable mutual benefits are likely to follow the breaching of parochial boundaries."(56)

THE CITY AS A SYSTEM: THE ENTROPY-INFORMATION ANALOG

One may consider the city, the country, the continent, etc., each in turn, as a system in itself and as components within other systems. We know from Thermodynamics that, in a closed system in stable equilibrium, a quantity called entropy must increase. But what is entropy? It most assuredly "is not a hazy concept or idea, but a measureable physical quantity...At the absolute zero point of temperature (roughly-273°C) the entropy of any substance is zero.

When you bring the substance into any other state...the entropy increases by an amount which is computed by dividing...(the) heat you had to supply by the absolute temperature at which it was supplied and...summing (all such contributions)."(55) The unit os entropy is, then, calories per degree centigrade.

Entropy may also be expressed in statistical terms as an interpretation of the properties of gases. That is:

Entropy = k(logD) (referring to natural logs)

where k is the Boltzmann constant and D is a measure of the atomic disorder of the body in question (see Schrodinger for a brief explanation, a text in Statistical Mechanics for a more detailed explanation of the concept.)

Thus entropy may itself be viewed as a measure of disorder, as a measure of the randomness of the atomic structure of the body being considered. Now if D is a measure of disorder then the reciprocal of D can be regarded as a measure of order. But:

$$\log(1/D) = -\log D$$

$$\text{so } K(\log(1/D)) = -K(\log D) = -\text{Entropy}$$

Hence entropy taken with a minus sign may be viewed as a measure of order.

The statement of the second law may now be interpreted to mean that a closed system in stable equilibrium tends towards disorder. This statement is not, in general, very applicable to the real world; processes of life and communication do not occur in closed systems at equilibrium. Nevertheless the exciting prospect of using entropy as a measure of disorder or, better yet, negative entropy (negentropy) as a measure of order has led to numerous discussions along these lines. And, as would be expected, many of these contain contradictory material. But, basically speaking, the tendency is to regard information as an element that adds order, or the potential for order, to a system. In this manner, information is seen as a form of negentropy. From this simple analogy numerous theories have arisen; some very complicated, others very simple. For example, Lamb has postulated that the state of mans knowledge may be represented as equal to the following expression:

k' (log((power of controlling paradigms)(known data/random data in universe)))

The 'power of the controlling paradigms is expressed as the probability that the predictions resulting from them are correct. Its value, and the value of the constant k' depend upon the state of mans knowledge. This expression may be viewed as an expression of the state of negentropy in regards to knowledge.(52, 53)

Cherry issues a distinct warning relevant here. "When such an important relationship between two branches of science has been exhibited, there are two ways in which it may be exploited; precisely and mathematically...or vaguely and descriptively. Since this relationship has been pointed out we have heard of 'entropies' of languages, social systems, and economic systems and of its use in various method-starved studies. It is the kind of sweeping generality which people will clutch like a straw. Some part of these interpretations has indeed been valid and useful, but the concept of entropy is of considerable difficulty and of a deceptively apparent simplicity."(47) But although the warning flashes the yellow caution light it most definitely does not flash a red stop light. The analogy has been useful as a conceptual device and could provide an interesting and useful tool for model development after numerous problems regarding the concept of information, its identification and measurement, have been solved.

But can anything be said about the analogy as it is today? The process of urbanization has been viewed as a characterization of negentropy.(25, 51) Theoretically, urbanization provides a certain order to life; a degree of specialization, a hint of formality, method. The randomness of spatial patterns is decreased in an urban setting. Or is it? In a poorly structured urban environment, one in which the decision making function is not centralized, the processes of development cannot be controlled. Land development degenerates into an uncoordinated hodge-podge of activity dictated primarily by the dollar. Random patterns reappear, all symptomatic of urban sprawl. I would then consider urban sprawl as an entropic process. However, in purpose, at least, we can consider the city as a negentropy machine.

We can safely say that the laws of thermodynamics would suggest that as the level of disorder within a system would tend to increase, that information value within the system would tend to decrease. This tendency towards disorder, towards chaos, has been interpreted to indicate that we are in the midst of a 'death march', that we shall eventually arrive at the state of utter confusion, at our Tower of Babel. This idea was operationalized, incorrectly though, when, at the end of the nineteenth century, the idea of a 'heat death' for the universe (theoretically to be caused by the eventual conversion of all available energy into heat) became popular.

The communication networks of our society may be viewed as one of the ways through which we fight the supposed 'death march of the second law'. Information can diffuse more rapidly in areas with better communications, allowing its effects to be felt sooner. Thus, the degree of organization within an area should be related to the efficiency of communication within that area. A typical urban area, however, can be characterized by both better communication facilities and by urban sprawl, as discussed above. These have opposing effects in terms of the entropy of the system. We may interpret this as implying that there is an inflationary aspect to information value. Just as the income of a family must increase at an ever increasing rate to maintain itself at a given dollar value, so must the level of communication rise at an increasing rate to preserve information value, to preserve negentropy.

Today the information-negentropy analog is only useful as a conceptual device but we may take heart from its existance and realize that in its further development lie fertile seeds for descriptive urban models that will enable us to better understand our contemporary social systems. Further, there is the "possibility that the notion of entropy within a social system provides the framework within which to study the effects of communication technology upon history and society - an important and neglected field."(51)

A COMMUNICATIONS THEORY OF URBAN GROWTH

In 1962, Richard Meier published the most comprehensive treatment of communications theory as a descriptor of urban growth that was or still is available.* This simple fact, that Meier's ideas have not been significantly advanced within a working framework in nine years, an amazing contradiction to a profession where models are developed as fast as ideas flow and data become available, indicates dramatically how this potentially exciting area has been neglected. Meier's purpose in publishing his monograph was "to bring to the attention of urbanists of all kinds the view of the city that a communications approach affords."(25) Apparently he failed in this respect, or at least his views did not evoke much of a response. Apparently readers either felt that Meier's logic, that "research on urban communication systems seems to provide much greater rewards - in the form of more powerful explanations - than does research in the more traditional fields,"(25) was incorrect or that their interest were too strong for them to change direction.

---

*Communication theory as it is used by Meier, and as it is used here, is not the mathematical Communication Theory discussed earlier. Rather, it embraces the conceptual realm of communications, the transfer of messages and their effects.

But whatever the reason, they did not react. The book has never been formally reviewed and, Meier feels, was not even understood for the first few years after it appeared. Meier viewed his book as an interim report; he expected "to construct a more explicit version of the theoretical model, a more elaborate set of supporting arguments and an amalgamation of the statistical materials."(25) For some reason or other he failed to do so. This is both a disappointment and a challenge. The challenge has not been met; it is questionable if it has even been recognized.

The first part of the above promise, that of an elaboration on the theoretical model, implies that some sort of theoretical model was presented in the book. This is untrue, or at least is misleading. The only models introduced are of a vague conceptual type, seemingly unsuited for quantification.

For example, Meier begins by conceptualizing the city as a living system with identifiable parts that go through identifiable processes of birth, development, maturation and decline. Just as a living system may be dissected and analyzed by different methods, so may a city and herein lies the source of our discontent. There is still disagreement over basic issues; what is a unit of life (i.e. what is a city), what is a transaction between units, etc. "Such uncertainty sets limits to comprehensive measures of urban activity."(25)

An interesting aspect of Meier's work is his delvings into history for the initial insights its lessons provide and for confirmation of his ideas as they developed. He recapitulates; "the evolution of the utility of agglomeration was traced back into pre-history. Certain givens about human beings, their genetics, primary relations necessary for nurture, the formation of coalitions for purposes of defense, and the exchange of goods seem to lead necessarily to the accumulation of knowledge in the households surviving the longest and to the selection and recombination of the most useful elements of culture by successors and off-shoots. Once village life based upon agriculture had been established the accumulation of techniques visibly accelerated. Villages grew to towns, and towns to cities, in short order, and the need for records required the use of written symbols. The latter caused a new spurt in accumulation of knowledge, and an increased amount of public activity..."(25)

The statistics Meier introduces as evidence often provide startling revelations into the type of society which we have created. In a typical city of three million, such as Chicago, he estimates that 3,600,000,000 man hours are spent watching television, making the tube the most widely used mode for the reception of social communications. Somewhat less startling is the uncanny awareness of clock time people in our modern cities seem to have developed. This implies that people are less concerned with what they do or what it means, then with the efficiency of their operations. This corresponds to Alexander's views of the dehumanizing aspects of urban life.

Meier considers the aspects of Information Theory and Cybernetics previously referred to. He uses them, along with his own interpretation of the entropy-information analog, to set forth three propositions: (1) "If a society of mortal individuals is to survive, information must be conserved;" (2) "A sector of society that grows in influence, wealth or power, measured in absolute terms, must experience a growth in information flow that occurred prior to or simultaneously with the other recorded growth;" and (3) "If advanced societies are to increase their organization (and capacities for cultural interaction), the interactions between automata in their service must increase even more rapidly."(25)

THE DYNAMICS OF AN URBAN COMMUNICATIONS THEORY

There is much appeal in the application of communication theory to urban development processes. The challenge of applying scientific laws to human behavior might cause one to forget the rationale for doing so. As Alexander has pointed out, our cities, which evolved for the facilitation of human communication, have lost their ability to sustain meaningful contact. It is true that, as urban dwellers, we are exposed to a greater number and variety of contacts, but these seem to be superficial. All too often they are empty and unsatisfying.

Whether or not you agree that the city should be a 'mechanism for sustaining meaningful human contact', it is clear that the city should have an identifiable purpose, a raison d'être. The hodge-podge that characterizes urban development today has partially resulted from a lack of coordinated planning, and from a lack of unity in whatever planning has occurred. By any rationale this is illogical, it is not possible to begin consideration of the design of any system without a guiding focus, without a set of goals.

So instead of viewing the urban area as a dynamic mechanism, planners see cities "as a place in which physical artifacts are spatially distributed and in which activity locations are geometrically arranged...the dominant conception is...of a static spatial arrangement. Neither traditional city plans nor their underlying studies have successfully depicted the city as a social process operating in space. And yet, city planners have traditionally sought to influence social processes, and particularly processes of human interaction, by manipulating the spatial arrangements..."(39) This situation is inherently more dangerous than a cautious 'let things happen as they will' philosophy. Witness the debacles brought forth by well meaning proponents of public housing and urban renewal.

What has been the result? "Plans have uniformly been expressed in other than interaction terms. Typically the plans are stated as static distributions of land use categories, sometimes with distributions...expressed as densities...But difficulties arise here. However adequate the land use and density language may be for depicting static site characteristics, it is not capable of dealing explicitly and specifically with the dynamic, locational patterns of human communications that occur through space but transcend any given place."(39)

Thus planners are given the onerous task of "improving certain behavioral aspects of the society. Yet we have neglected the conception of the city as a social system in action. For metropolitan planning purposes it is important that we also see the city as a culturally conditioned system of dynamic interrelationships among individuals and groups, as these are modified by their locational distributions."(39)

A theory of urban growth, to be a valid descriptor, must account for the dynamic interaction patterns that characterize urban life and, indeed, are responsible for its evolution. Such a theory might be based upon the phenomena of urban communication.

PART 1: On Urban Communication and Political Integration, Transaction Analysis and Other Concepts as They Deal with Urban Communication

1. Alexander, Christopher. "The City as a Mechanism for Sustaining Human Contact," in Environment for Man, William R. Ewald, Jr., ed. Bloomington, Indiana: Indiana University Press, 1967, pp. 60-102.

2. Brams, Steven John. Flow and Form in the International System, unpublished doctoral dissertation, Northwestern University, Evanston, Illinois, June 1966.

3. Bugher, H. "Utilidor Project 68-2: Preliminary Findings and Observations," Ekistics, Vol. 30, No. 179, October 1970, pp. 283-284.

4. Cowan, Peter. "Communications," Urban Studies, Vol. 6, No. 3, November 1969, pp. 436-446.

5. Deutsch, Karl W. "Communication Theory and Political Integration," in The Integration of Political Communities, Philip E. Jacob and James V. Toscano, eds. Philadelphia: J. P. Lippincott Company, 1964, pp. 46-74.

6. ________. "Integration and Autonomy: Some Concepts and Data," Ekistics, Vol. 30, No. 179, October 1970, pp. 327-331.

7. ________. Nationalism and Its Alternatives. New York: Alfred A. Knopf, Inc., 1969, 200 pp.

8. ________. Nationalism and Social Communication. Cambridge, Massachusetts: MIT Press, 1953, pp. 345 pp.

9. ________. "On Social Communication and the Metropolis," Daedalus, special issue on The Future Metropolis, Vol. 90, No. 1, 1961, pp. 99-110.

10. Deutsch, Karl W. "Transaction Flows as Indicators of Political Cohesion," in *The Integration of Political Communities*, Philip E. Jacob and James V. Toscano, eds.: Philadelphia: J. P. Lippincott Company, 1964, pp. 75-98.

11. __________, and Walter Isard. "A Note on a Generalized Concept of Effective Distance," *Behavioral Science*, Vol. 6, No. 4, October 1961, pp. 308-311.

12. Duncan, Hugh Dalziel. "The Search for a Social Theory of Communication in American Sociology," in *Human Communication Theory: Original Essays*, Frank E. X. Dance, ed. New York: Holt, Rhinehart and Wilson, Inc., 1967, pp. 236-263.

13. Fagen, Richard R. *Politics and Communication*. Boston: Little, Brown and Company, 1966, 162 pp.

14. Galpin, C. J. "The Social Anatomy of an Agricultural Community," *Agricultural Extension Station Bulletin 34*. Madison, Wisconsin, 1915.

15. Gerbner, George. "Towards a General Model of Communication," *AV Communication Review*, Vol. 4, No. 3, Summer 1956, pp. 171-189.

16. Goodman, Leo A. "Statistical Methods for the Preliminary Analysis of Transaction Flows," *Econometrica*, Vol. 31, No. 1-2, January-April 1963, pp. 197-208.

17. Haggett, Peter and Richard I. Chorley. *Network Analysis in Geography*. New York: St. Martins Press, 1970.

18. Jacob, Philip E. and Henry Teune. "The Integrative Process: Guidelines for the Analysis of the Bases of Political Community," in *The Integration of Political Communities*, Philip E. Jacob and James V. Toscano, eds. Philadelphia: J. P. Lippincott Company, 1964, pp. 1-45.

19. Jacob, Philip E. and James V. Toscano, eds. *The Integration of Political Communities*. Philadelphia: J. P. Lippincott Company, 1964, 314 pp.

20. Katz, Elihu. "Communication Research and the Image of Society: Convergence of Two Traditions," *American Journal of Sociology*, Vol. 65, 1959, pp. 435-440.

21. Keller, Suzanne. "Human Communication and Social Networks at the Microscale," *Ekistics*, Vol. 30, No. 179, October 1970, pp. 306-308.

22. Knox, William, et al. *Problems of Communication in Large Cities*, A Report to the Secretary. Washington, D.C.: The Smithsonian Institute, April 1971.

23. Larson, Carl E. and Frank E. X. Dance, eds. *Perspectives on Communication*, Speech Communication Center, University of Wisconsin, Milwaukee, 1968.

24. Lerner, Daniel. "Communication Systems and Social Systems: A Statistical Exploration in History and Policy," *Behavioral Scientist*, Vol. 2, 1957, pp. 266-275.

25. Meier, Richard L. *A Communication Theory of Urban Growth*. Cambridge: MIT Press, 1962, 184 pp.

26. __________. "The Metropolis as a Transaction-Maximizing System," *Daedalus*, special issue on *The Conscience of the City*, Vol. 97, No. 4, Fall 1968, pp. 1292-1313.

27. Newman, John B. "A Rationale for a Definition of Communication," in *Communication and Culture*; Readings in the Codes of Human Interaction, Alfred G. Smith, ed. New York: Holt, Rhinehart and Winston, 1966, pp. 55-63.

28. Owen, Wilfred. "Notes on Networks," *Ekistics*, Vol. 30, No. 179, October 1970, pp. 283-284.

29. Pierce, J. R. "Communication Networks and New Communication Technology," *Ekistics*, Vol. 30, No. 179, October 1970, pp. 312-313.

30. Pye, Lucian W., ed. *Communications and Political Development*. Princeton, New Jersey: Princeton University Press, 1963.

31. Savage, Richard and Karl W. Deutsch. "A Statistical Model of the Gross Analysis of Transaction Flows," *Econometrica*, Vol. 28, No. 3, July 1960, pp. 551-572.

32. Schramm, Wilbur. "Information Theory and Mass Communication," *Journalism Quarterly*, Vol. 37, 1955, pp. 131-146.

33. Smith, Alfred G., ed. *Communication and Culture*. New York: Holt, Rinehart and Wilson, 1966.

34. Teune, Henry. "Models in the Study of Political Integration," in *The Integration of Political Communities*, Philip E. Jacob and James V. Toscano, eds. Philadelphia: J. P. Lippincott Company, 1964, pp. 283-303.

35. Thayer, Lee. "Communication and Organization Theory," in *Human Communication Theory: Original Essays*, Frank E. X. Dance, ed. New York: Holt, Rhinehart and Winston, 1967, pp. 70-115.

36. ________. "Human Communication: Tool, Game, Ecology," in *Perspectives on Communication*, Carl E. Larson and Frank E. X. Dance, eds. Milwaukee: University of Wisconsin, 1968, pp. 11-19.

37. Tonuma, Koicha. "The Network City," *Journal of High Speed Transportation*, Vol. 3, No. 2, May 1969, pp. 203-219.

38. Toscano, James V. "Transaction Flow in Metropolitan Areas: Some Preliminary Explorations," in *The Integration of Political Communities*, Philip E. Jacob and James V. Toscano, eds. Philadelphia: J. P. Lippincott Company, 1964, pp. 98-119.

39. Webber, Melvin M. "The Urban Place and the Non-Place Urban Realm," in *Explorations into Urban Structure*, Melvin M. Webber, et al. Philadelphia: University of Pennsylvania Press, 1964, pp. 79-153.

40. Wheaton, William L. C. "Integration at the Urban Level: Political Influence and the Decision Process," in *The Integration of Political Communities*, Philip E. Jacob and James V. Toscano, eds. Philadelphia: J. P. Lippincott Company, 1964, pp. 120-142.

41. *Communications Technology for Urban Improvement*. Committee on Telecommunications. Washington, D.C.: National Academy of Engineering, June 1971.

42. *Regional Urban Communications*. Detroit Michigan: Metropolitan Fund, Inc., March 1970.

43. *Telecommunications for Enhanced Metropolitan Function and Form*. Committee on Telecommunications. Washington, D.C.: National Academy of Engineering, August 1969.

44. *Ekistics*. Vol. 30, No. 179, October 1970, special issue on *Networks and Human Settlements: The 1970 Athens Ekistics Month*.

PART 2: On Communication Theory, Entropy, Cybernetics and Related Concepts

45. Ackoff, Russell L. "Towards a Behavioral Theory of Communication," in Modern Systems Research for the Behavioral Scientist, Walter Buckley, ed. Chicago: Aldine Publishing Company, 1968, pp. 209-218.

46. Buckley, Walter, ed. Modern Systems Research for the Behavioral Scientist. Chicago: Aldine Publishing Company, 1968, 525 pp.

47. Cherry, Colin. On Human Communication. New York: MIT Press and John Wiley and Sons, Inc., 1957, 331 pp.

48. "The Co   . "The Communication of Information," American Scientist, Vol. 40, No. 4, October 1952, pp. 640-664.

49. Deutsch, Karl W. "Toward a Cybernetic Model of Man and Society," in Modern Systems Research for the Behavioral Scientist, Walter Buckley, ed. Chicago: Aldine Publishing Company, 1968, pp. 387-400.

50. Elias, Peter. "Two Famous Papers," Institute of Radio Engineers, Group on Information Theory, Transactions, Vol. IT-4, September 1958.

51. Katzman, Natan. "Communication Flow and Social Entropy," Ekistics, Vol. 29, No. 172, March 1970, pp. 212-219.

52. Lamb, George G. "A Framework for Analysis of Societal Change: Basic Presuppositions," Buenos Aires: Fourth Inter-American Congress of Chemical Engineering, April 1969.

53. ________. "Basic Concepts in Subjective Information Theory, Thermodynamics and Cybernetics of Open Adoptive Societal Systems," London: International Congress of Cybernetics, September 1969, 24 pp.

54. Miller, George A. "What is Information Measurement," American Psychologist, Vol. 8, 1963, pp. 3-11.

55. Schrodinger, Erwin. "Order, Disorder and Entropy," in Modern Systems Research for the Behavioral Scientist, Walter Buckley, ed. Chicago: Aldine Publishing Company, 1968, pp. 143-146.

56. Shibutani, Tamotsu. "A Cybernetic Approach to Motivation," in *Modern Systems Research for the Behavioral Scientist*, Walter Buckley, ed. Chicago: Aldine Publishing Company, 1968, pp. 330-336.

57. Wiener, Norbert. *The Human Use of Human Beings: Cybernetics and Society*. Garden City, New York: Doubleday, Anchor, 1954.

INDEX

Bibliographies, 35, 47
Collections, 19, 23, 30, 33, 44, 46
Communication and Society:
    general, 7, 8, 12, 13, 20, 21, 52
    urban, 4, 25, 39
    rural, 14
Communication Technology, 22, 29, 41, 42, 43
Communication Theory, 45, 46, 47, 48, 53, 54
Communications; identification and definitions, 15, 25, 27, 32, 35, 36, 47
Cybernetics and Society, 46, 49, 56, 57
Entropy-Information Analog, 25, 46, 47, 50, 51, 52, 53, 55
Models of Urban Communication:
    conceptual, 3, 25, 37, 39, 51
    quantitative, 11, 16, 24, 31, 38
Networks, 17, 28, 29, 37, 44
Political Integration, 5, 6, 7, 8, 18, 19, 34, 40
The City as a Communication Device, 1, 3, 9, 25, 26
Transaction Analysis, 2, 7, 10, 16, 19, 31, 38

COUNCIL OF PLANNING LIBRARIANS   Exchange Bibliography #608

COMMUNICATION AS A PHENOMENON FOR DESCRIPTION AND PREDICTION:

AN URBAN DETERMINANT

Additional copies available from:

Council of Planning Librarians
Post Office Box 229
Monticello, Illinois   61856

for $3.00

BOUND BY
HNM

UNIVERSITY OF ILLINOIS-URBANA
016.7114C73E C001
EXCHANGE BIBLIOGRAPHY. URBANA, ILL
602-614 1974
3 0112 029109367